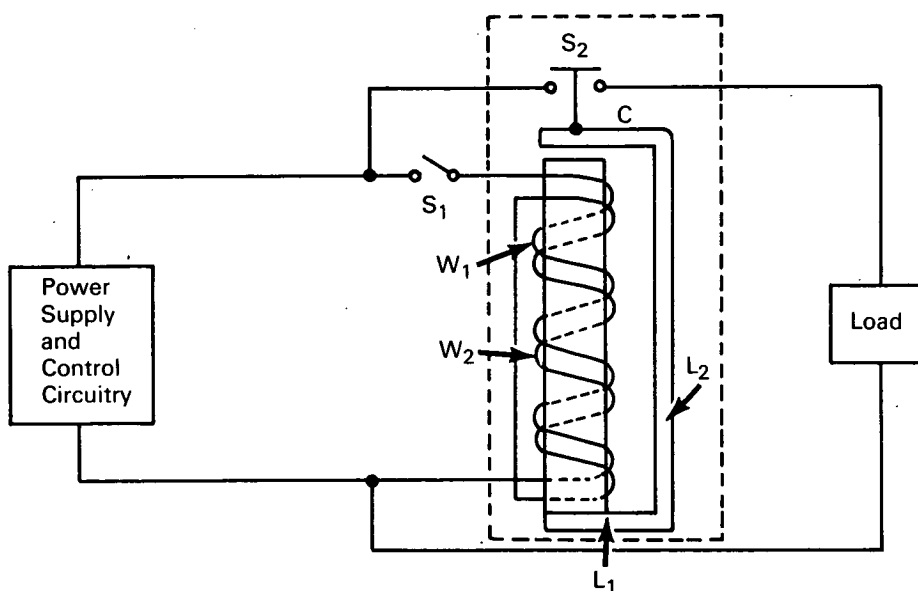


NASA TECH BRIEF



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High Transients Suppressed in Electromagnetic Devices



The problem:

In the operation of electromagnetic devices such as relays and solenoids, high transients are caused by rapid field decay upon removal of current to the devices. Previous methods of suppressing these transients have been less than ideal in that they resulted in increased size and weight, polarity dependence, and increases in contact resistance due to outgassing.

The solution:

A bifilar winding around the magnetic core alternately spaced vertically and radially from the core to achieve a high coefficient of coupling.

How it's done:

An actuation winding W_1 about the core is connected to a power supply through a switch S_1 . A

transient voltage suppression coil W_2 is alternately wound with its ends connected to form a short circuited winding. A leg L_1 projects laterally from the base of the core and has a vertical leg L_2 extending upward to slightly above the top of the core at which point a contact assembly C is spring loaded to extend laterally above the core. A load is connected in series with the device through a switch S_2 .

When S_1 is closed, current flows through W_1 creating a strong magnetic field that pulls C down to contact the core at the same time pulling S_2 closed connecting the load to the power supply.

Opening S_1 de-energizes W_1 causing the magnetic field to decay rapidly to produce a transient voltage. The high coefficient of coupling between W_1 and W_2 causes the transient to bleed off through W_2 rather

(continued overleaf)

than seek other dissipative paths. When the magnetic field has decayed sufficiently, spring loaded contact C returns to the horizontal, opening S₂ and removing the load from the power supply.

Notes:

1. This method affords a simple and inexpensive suppression of high transient voltages that would otherwise cause interference in the operation of sensitive components adjacent the electromagnetic device.
2. To control the effect on relay release time, it is only necessary to select the proper wire size for W₂.

3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Kennedy Space Center
Kennedy Space Center, Florida 32899
Reference: B67-10031

Patent status:

This is the invention of a NASA employee and a patent application has been filed. Inquiries concerning license rights may be made directly to the inventor, Mr. Charles Wayne Marion, at Kennedy Space Center, Kennedy Space Center, Florida 32899.

Source: Charles Wayne Marion
(KSC-66-13)